IJC Heart & Vasculature 8 (2015) 73–74

Contents lists available at ScienceDirect

IJC Heart & Vasculature

journal homepage: http://www.journals.elsevier.com/ijc-heart-and-vasculature

Letter to the Editor

Controlled heart rate and blood pressure reduce the life threatening aortic events and increase survival in patients with type B aortic dissection: A single center experience

Karmacharya Ujit Kumar, Qian Zhao, Xue Bai, Ang Li, Pandit Anjali, Haibin Yu, Wei Zhu, Ting Zou, Yingtong Ma *, Xiang Ma **

First Affiliated Hospital of Xinjiang Medical University, Department of Cardiology, Urumqi 830054, Xinjiang, China

ARTICLE INFO

Article history:
Received 23 April 2015
Accepted 3 May 2015
Available online 27 May 2015

Keywords:
Aortic dissection
Heart rate
Aortic events

Aortic dissection (AD) is a life threatening cardiovascular condition with high morbidity and mortality [1]. Although various approaches and long-term management have been discussed, a few studies have been done on the effect of heart rate (HR) and blood pressure (BP) on the outcomes of type B AD [2,3].

We retrospectively studied the effect of HR (60 to 90 bpm) and BP (below 140/90 mm Hg) in terms of secondary events and survival in type B AD (both acute and chronic).

From January 2007 to January 2014, of the 346 cases of AD, 114 were type A, 218 were type B, and 14 were others (intramural hematoma, aortic aneurysm, diagnosis equivocal). Twenty-five patients were lost and 193 patients remained for the final study. Diagnosis was based on contrast computed tomography (CCT) showing dissected descending thoracic aorta containing both true and false lumens.

Dissections were considered acute for the first 14 days following the intimal entry tear and chronic after 14 days [4]. HR was divided according to 10 bpm increase. BP was divided into control group (BP ≤120/80 mm Hg) and case group (BP ≥ 140/90 mm Hg). Average HR was taken as a baseline for analysis, defined as HR from admission till discharge (mean HR). Information regarding follow-up was obtained from the attending cardiologist or phone calls with patients and/or family members. Mean follow-up was 35 ± 12 months. Patients with all forms of type B AD (acute and chronic) were included.

The baseline characteristics and outcome are shown in Table 1. Overall HR, SBP, and DBP on admission were 83.14 ± 15.21 bpm, 147 ± 28.28 mm Hg, and 87.63 ± 19.05 mm Hg, respectively. The risk factors of AD were evaluated, where hypertension accounts for 82.38%, smoking 46.63%, and male sex 76.16%. Mean age was 50.49 ± 12.60 years.

Frequency of aortic events at different HR levels is shown in Table 2. Most common aortic events was recurrent pain ($n = 40$). Others include transformation into type A AD ($n = 5$), re-stenting ($n = 5$), recurrent AD ($n = 5$), and aortic rupture ($n = 4$). Frequency of aortic events between control group ($n = 58$, 30%) and case group ($n = 133$, 70%) is shown in Table 3. Few aortic events were observed in the control group ($n = 15$) compared to case group ($n = 43$). However, there was no statistical significance ($P > 0.05$) both in HR and BP groups in terms of aortic events.

Frequency of death at different HR levels and BP group is shown in Tables 4 & 5. Total death was 28; in-hospital 17 (8.8%) and outside the hospital 11 (5.6%). In-hospital mortality was higher in above 90 bpm HR level. The frequency of death was higher in case group 19 (14.1%) compared to control group 9 (15.5%), although there was no statistical significance ($P > 0.05$) both in HR and BP groups in terms of mortality. Death inside the hospital was due to ruptured aorta ($n = 4$), multi-organ dysfunction syndrome (MODS) ($n = 4$), cerebrovascular accident (CVA) ($n = 2$), low cardiac output ($n = 3$), sudden death ($n = 2$), and cause unknown ($n = 2$). Cause of death outside of hospital was unknown.

The compliance of medications was confirmed in 151 cases (78.23%) from clinic visits and interviews with patients and patients' family members. Patients were on beta receptor blockers (BRB) (68.07%), angiotensin converting enzyme inhibitors (ACEIs) (26.14%), angiotensin receptor blockers (ARBs) (47.48%), calcium channel blockers (CCBs) (45.38%), nitrates (14.71%), and statins (58.82%); 21.67% received only medical therapy, 75.0% received both medical and endovascular therapy, and 3.33% underwent open chest surgery.

Compliance with the medications was closely related with the aortic events and mortality. Noncompliance was defined as not taking medicine at all, taking medicines irregularly, not taking as modified during follow-ups, and taking only one medicine at a time. Duration of hospital stay was 7 to 23 days, with duration of CCU stay lasting 6 to 18 days.

Although most of the aortic events occurred between 60 and 90 bpm HR, most common was recurrent pain ($n = 40$), which is considered

* Correspondence to: Y. Ma, First Affiliated Hospital of Xinjiang Medical University, Department of Cardiology, 137 Liyushan Road, Urumqi 830054, China. Tel.: +86 13809936181; fax: +86 9914365387.
** Correspondence to: X. Ma, First Affiliated Hospital of Xinjiang Medical University, Department of Cardiology, 137 Liyushan Road, Urumqi 830054, China. Tel.: +86 13669939349; fax: +86 9914365387.
E-mail addresses: myt-xj@163.com (Y. Ma), maxiangxj@yahoo.com (X. Ma).

http://dx.doi.org/10.1016/j.ijcha.2015.05.008

Table 1
Baseline characteristics and outcomes of the patients.

Category	≤60	61–70	71–80	81–90	≥91	t/X^2	P
N,(%)	8 (4.2)	29 (15.0)	60 (31.1)	41 (21.2)	55 (28.5)		
Age, (year)	48.8 ± 14.2	55.8 ± 14.4	49.1 ± 10.7	50.6 ± 12.8	48.1 ± 12.0	3.85	0.426
Male Sex n(%)	6 (75.0)	21 (72.4)	47 (78.3)	30 (73.2)	43 (78.2)	0.71	0.950
Initial SBP (mmHg)	162.1 ± 26.0	142.0 ± 21.6	146.3 ± 30.2	145.2 ± 24.0	150.9 ± 27.6	5.05	0.282
Initial DBP (mmHg)	85.6 ± 13.8	81.2 ± 15.6	87.75 ± 18.3	86.3 ± 16.7	89.6 ± 20.2	3.86	0.425
Smoking History, n (%)	3 (37.5)	14 (48.2)	24 (40.0)	21 (51.2)	28 (50.9)	2.11	0.715
Hypertension, n (%)	8 (100.0)	24 (72.4)	50 (83.3)	33 (80.5)	44 (80.0)	3.49	0.479

SBP, systolic blood pressure; DBP, diastolic blood pressure.

Table 2
Frequency of aortic events at different heart rate levels.

	TA-AD	Recurrent pain	Re-Stenting	Recurrent AD	Aortic rupture
≤60 bpm ($n = 8$)	0	3 (42.8)	0	1 (12.5)	1 (12.5)
61–70 bpm ($n = 29$)	2 (7.1)	8 (38.1)	1 (4.7)	1 (3.4)	0
71–80 bpm ($n = 60$)	1 (1.7)	13 (25.5)	2(3.9)	2 (3.5)	2 (3.4)
81–90 bpm ($n = 41$)	1 (2.5)	9 (28.1)	1 (3.1)	1 (2.5)	1 (2.5)
>90 bpm ($n = 55$)	1 (2.0)	7 (16.7)	1 (2.3)	0	0
X^2	2.55	4.59	0.56	4.39	6.15
P	0.636	0.331	0.777	0.355	0.188

TA-AD, type A aortic dissection; AD, aortic dissection.

Table 3
Frequency of aortic events between control group and case group.

Group	Control group	Case group	X^2	P
AD n (%)	2 (3.6)	3 (2.4)	0.20	0.650
Recurrent pain n (%)	9 (20.9)	31 (28.2)	0.84	0.359
Re-stenting n (%)	1 (2.2)	4 (3.6)	2.68	0.261
Recurrent AD n (%)	2 (3.5)	3 (2.4)	0.187	0.665
Aortic rupture n (%)	1 (1.8)	3 (2.3)	0.04	0.829

Table 4
Frequency of death at different heart rate levels.

Heart rate level	Total death n (%)	In-hospital death n (%)	Death outside the hospital n (%)
≤60 bpm	0	0	0
61–70 bpm	4 (22.2)	3 (16.7)	1 (5.6)
71–80 bpm	8 (10.5)	4 (5.3)	4 (5.3)
81–90 bpm	8 (12.7)	4 (6.4)	4 (6.3)
>90 bpm	8 (22.8)	6 (17.1)	2 (5.7)
X^2	4.13	6.17	0.13
P	0.388	0.187	0.998

Table 5
Frequency of death between control group and case group.

Group	Control group	Case group	X^2	P
Total death n (%)	9 (15.5)	19 (14.1)	0.06	0.794
In-hospital death n (%)	7 (12.1)	10 (7.4)	1.09	0.295
Death outside the hospital n (%)	2 (3.5)	9 (6.7)	0.78	0.377

benign as compared to other complicated life-threatening events, such as transformation to type A AD, aortic rupture, recurrent AD, etc. We found a decrease in aortic events and mortality in the control group as compared to the case group.

Qinghua et al. [5,6] found that the use of BRBs, CCBs, and ACEIs were associated with improved survival in all patients (type A or B). Our study also supports that with the compliant use of medications, there was decrease in aortic events and increase in survival.

Kazuhisa et al. [7] found that tight HR control reduced the secondary events and improved the outcome of medical treatment in patients with type B acute AD, but our study showed that with controlled HR and BP, such improvement can be achieved. Of note, our study included all forms of type B AD.

Although due to small sample size, significant conclusion cannot be made, but we believe that a large cohort multi-centered prospective study would modulate the potential role of HR and BP to consider it in the future cardiovascular guidelines.

References

[1] Richartz BM, Smith DE, Cooper JV, et al. New classification of aortic dissection with improved impact on prognosis. J Am Coll Cardiol 2002;39:A 863.
[2] Fox K, Borer JS, et al. Rest heart rate in cardiovascular disease. J Am Coll Cardiol 2007; 50:079 [ISSN 0735-07].
[3] Suzuki T, Mehta RH, et al. Clinical profiles and outcomes of acute type B aortic dissection in the current era: lessons from the International Registry of Aortic Dissection (IRAD). Circulation 2003;108(Suppl. 1):II312–7.
[4] Estrera AL, Miller CC, et al. Update on outcomes of acute type B aortic dissection. Ann Thorac Surg 2007;83(2):S842–5.
[5] Nienaber CA, Rousseau H, et al. Randomized comparison of strategies for type B aortic dissection: the INvestigation of STEnt Grafts in Aortic Dissection (INSTEAD) trial. Circulation 2009;120(25):2519–28.
[6] Yuan Q, Hui Y, et al. Comparison of chronic type A aortic dissection with acute type A dissection of short-term and long-term survival rate. Int J Cardiol 2014;175:363–5.
[7] Kodama K, Nishigami K, et al. Tight heart rate control reduces secondary adverse events in patients with type B acute aortic dissection. Circulation 2008;118(Suppl. 1): S167–70.